

Soil Mechanics (B)

Calendar: 3rd day semester

Contact Hours: TP 52,5h; OT 15,0h

Scientific Area: Geotechnics

Intended learning outcomes (knowledge, skills and competences to be developed by the students):

Students should be able to: i) understand the basic characteristics of soils and the relevant classifications applicable, ii) identify the mechanisms involved in soil compaction; iii) understand the effects of water and its movement within the soil; iv) understand and apply the concepts of effective stress and total stress in soil, v) analyse the behavior of soils in relation to its deformability and strength.

Skills and competences: organized and systematic thinking; analytical capacity; critical thinking and innovative sense; inductive reasoning; effective communication in mother tongue; appropriate use of information technologies and communication; development of consistent and coherent proposals for solving technological problems.

Syllabus:

1. Introduction – Geotechnics and Soil Mechanics.
2. Soil basic characteristics, identification and classification–Composition of soil. Basic characteristics. Particle size distribution curves. The influence of water. Soil classification.
3. Compaction and stabilization of soil–Theory and compaction curve. Compaction test.
4. Ground water–Static pressures. Capillarity. Permeability of stratified media. One and two dimensional fluid flow. Hydraulic failure.
5. Stresses within soil –Effective stress principle. Mohr's Circle. Stress paths.
6. Consolidation–Settlements. Compression of clays. Consolidation theory of Terzaghi. Horizontal and vertical consolidation.

7. Shear strength – Failure criterion and envelope. Drained and undrained tests. Behaviour of sand and clay. Expression of Skempton.

Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

Syllabus just fit to learning outcomes exhibited by the following correspondence: 1 and 2 with i); 1 and 3 with ii); 1 and 4 with iii); 1 and 5 with iv); 1, 6 and 7 with v).

References:

Craig, R.F. Soil Mechanics. 5th edition. Chapman & Hall ed., 1992.

Lambe, T. W., Whitman, R. V. Soil Mechanics. SI Version. John Wiley & Sons ed., 1979.

Ludovico Marques, M. Folhas das aulas teóricas de Mecânica dos Solos. ESTB, 2011. Barreiro.

Ludovico Marques, M. Folhas das aulas práticas de Mecânica dos Solos. ESTB, 2012. Barreiro. Matos

Fernandes, M. Mecânica dos Solos. Conceitos e princípios fundamentais. Vol1. FEUP, 2006. Porto.